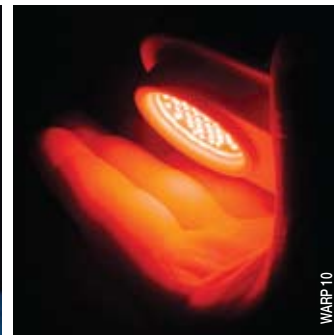


# HEALS™ Device for Cancer Treatment, Wound Healing, and Pain Management

*Light therapy helps fight cancer and provides natural, drug-free pain relief*



High-Emissivity Aluminiferous Luminescent Substrate (HEALS) technology originally developed by NASA's Marshall Space Flight Center to grow plants on board the space shuttle has developed into a state-of-the-art medical device that increases the effectiveness of chemotherapy treatments and provides pain relief for thousands of Americans. Through the Small Business Innovation Research (SBIR) program, Quantum Devices, Inc. (QDI) developed this award-winning, non-invasive medical device, WARP 10™ and WARP 75™, for use in cancer treatments, prevention of oral mucositis (painful sores that result from radiation and chemotherapy), wound healing, and pain management. The HEALS device also shows promising applications in the treatment of bone atrophy, burns, diabetic ulcers, multiple sclerosis, Parkinson's disease, Alzheimer's disease, and degenerative retinal/eye disorders.

*HEALS, WARP 10, and WARP 75 are trademarks of Quantum Devices, Inc.*

[www.nasa.gov](http://www.nasa.gov)

## Benefits of Technology Transfer

- **Improves outcomes for cancer patients:** HEALS technology activates light-sensitive, tumor-treating drugs that completely destroy cancer cells while leaving the surrounding tissue virtually untouched.
- **Prevents oral mucositis:** The non-invasive device prevents the development of oral mucositis in cancer patients, a painful side effect of chemotherapy and radiation.
- **Provides pain relief:** Consumers can use WARP 10, a hand-held device, to treat minor injuries, heal wounds, and alleviate chronic pain.
- **Lowens health care costs:** HEALS technology is significantly less expensive than comparable cancer therapies (e.g., standard daily treatment for oral mucositis costs \$7,000-10,000, whereas QDI's daily HEALS treatment for oral mucositis costs less than \$3).
- **Public acclaim:** This technology has won numerous accolades, including the Space Technology Hall of Fame award, Marshall Space Flight Center Hallmark of Success award, the Wisconsin Governor's New Product Award, and the prestigious Tibbetts Award as an SBIR success story.
- **Offers promising new applications:** Ongoing research using HEALS technology shows excellent potential for the treatment of arthritis, bone atrophy, diabetic ulcers, burns, eye conditions, multiple sclerosis, Alzheimer's disease, and Parkinson's disease.

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### On the Record

“With the help of NASA’s Innovative Partnerships Program, Quantum Devices and its medical partners have been able to take a space technology and adapt it for an entirely different application to significantly help people here on Earth. The collaboration between NASA’s Marshall Space Flight Center and small businesses has spurred innovation that is touching millions of lives on Earth for the better.” — *Ronald Ignatius, Founder and Chairman of the Board, Quantum Devices, Inc.*

### About Quantum Devices, Inc.

Quantum Devices, Inc., based in Barneveld, Wisconsin, develops and markets silicon photodiodes, optical encoders, and light-emitting diodes (LEDs) for agriculture and medical applications. QDI’s High-Emissivity Aluminiferous Luminescent Substrate (HEALS) technology allows an LED about the size of a grain of salt to produce 12 times more radiant energy than the sun in the same bandwidth. These LED systems have become the gold standard for photobiomodulation therapy (PBMT), an emerging technique in which exposure to a HEALS light source reduces the inflammatory response, increases circulation, and accelerates wound healing. QDI has also pioneered advancements in the field of photodynamic therapy (PDT), a non-invasive, high-intensity light that can be used to activate chemotherapy drugs that destroy cancer cells within a tumor, leaving the surrounding tissues unharmed.

### Technology Origins

In the early 1990s, NASA’s Marshall Space Flight Center researchers were experimenting with plant growth in space. Ronald Ignatius, founder of QDI, proposed the use of LEDs as a low-energy light source, and QDI was given an SBIR contract to develop the concept. QDI successfully developed a plant growth chamber using HEALS as the light source, which enabled plants to grow on seven space shuttle missions and in the International Space Station’s Advanced Astroculture facility. Encouraged by the way HEALS enhanced cellular function in plants, NASA and QDI began to study potential medical applications for HEALS light therapy. NASA awarded QDI several new SBIR contracts to investigate how HEALS might promote wound healing and mitigate loss of bone and muscle mass in a microgravity environment.



### Finding New Uses

QDI and NASA researchers began to collaborate on multiple clinical trials using HEALS as a high-intensity light source for cancer treatments and the prevention of oral mucositis. The team discovered that HEALS technology provided a highly targeted, non-invasive, cost-efficient method to activate chemotherapy drugs and attack cancer cells. HEALS was also found to prevent and treat oral mucositis.

### The Transfer Process

Follow-on research grants from the Defense Advanced Research Projects Agency (DARPA) helped QDI fully transition the space technology into a state-of-the-art, non-invasive medical device. QDI’s WARP 10 (Warfighter Accelerated Recovery by Photobiomodulation) is a high-intensity, hand-held, portable HEALS unit used to relieve muscle and joint pain, arthritis, stiffness, and muscle spasms. The WARP 10 is currently being used by the U.S. military to treat battlefield injuries, and a consumer version is commercially available. In 2007, QDI released a larger, more advanced version of the device, WARP 75.

### Looking Ahead

Promising therapies for the treatment of Alzheimer’s disease, Parkinson’s disease, brain injuries, strokes, burns, bone loss, pressure sores, wound healing, depression, and retinal disorders, including diabetic retinopathy, glaucoma, and macular



degeneration. Several products are currently in the research, development, and clinical testing phases, including a state-of-the-art HEALS device that will help in the fight against multiple sclerosis.

### For More Information

If you would like more information about this technology (MFS-31651-1) or about other technologies available for license, please contact:

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